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Presented for filing is a new utility patent application of:

Applicant: JEFFREY H. MICHAUD, DOUGLAS K. OLSON
Title: ASSIGNING A HOT SPOT IN AN ELECTRONIC
                ARTWORK

Enclosed are the following papers, including all those required to receive a filing date under 37 CFR §1.53(b):

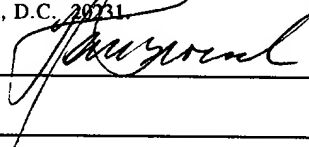|	Pages
Specification	9
Claims	2
Abstract	1
Declaration	1
Drawing(s)	2

Enclosures:
  • Postcard.

No filing fee is being paid at this time.

If this application is found to be INCOMPLETE, or if a telephone conference would otherwise be helpful, please call the undersigned at 650/322-5070.

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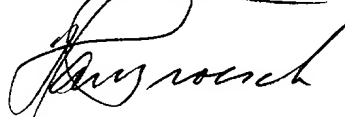
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Respectfully submitted,

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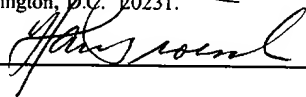Reg. No. 36,950

Enclosures

APPLICATION

FOR

UNITED STATES LETTERS PATENT

TITLE: ASSIGNING A HOT SPOT IN AN ELECTRONIC ARTWORK

INVENTOR(S): JEFFREY H. MICHAUD
DOUGLAS K. OLSON

ASSIGNING A HOT SPOT IN AN ELECTRONIC ARTWORK

CROSS REFERENCE TO RELATED APPLICATIONS
Not Applicable.

STATEMENT REGARDING FEDERALLY SPONSORED
5   RESEARCH OR DEVELOPMENT
Not Applicable.

BACKGROUND OF THE INVENTION

The invention relates to generating artwork or digital images with hot areas for computer program graphical

10   user interfaces.

Computer program interfaces have long provided user-selectable graphics, such as buttons, as elements through which a user may interact with a computer program, to select an option or request a service from the program,

15   for example. In network-based or distributed computer program applications, the selection of an interface element in a client program on one computer may be directed to either that program or to another program, such as a server program running on a separate computer. In Internet and

20   intranet applications, the server program typically resides on a server computer remote from the client computer and communicating with it through a network connection.

One widely distributed and used class of client program is the HTML browser, such as the Netscape Navigator™

25   browser, available from Netscape Communications Corporation of Mountain View, California. Browsers typically provide support for a number of industry standard protocols, such as HTTP (HyperText Transport Protocol), and industry standard

formats, such as HTML (HyperText Markup Language).

An HTML document may include links to other resources. Graphically, the simplest form of link is the URL (Universal Resource Locator) of the resource displayed in the familiar form of underlined text. Access to a resource may also be provided through an image that a user may select to request the resource. The HTML specification includes, among other elements, a MAP element and an IMG element with an ISMAP attribute for this purpose. The ISMAP element can be used to define a server-side image map. When the user clicks on the image, the ISMAP attribute of the element causes the image (x,y) coordinates of location clicked to be passed to the server in a derived URL. A MAP element may be used with an IMG element to provide a client-side image map. AREA elements define simple closed regions, such as polygons and circles, by their coordinates within the image. AREA elements in a MAP element can define hot spots or areas on the image and link the hot spots to URLs. A hot spot is an area of an image, which may correspond to graphic object or a section of text, that activates a function when selected.

SUMMARY OF THE INVENTION

In general, in one aspect, the invention features apparatus and methods implementing a technique for creating an electronic artwork with a hot area. For a selected layer of the artwork, a non-transparent region is identified and an action is assigned to an area corresponding to the non-transparent region, the action defining a function that will be activated when the area is selected. The technique is advantageous in computer application programs that

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composite images from layers.

Advantageous implementations of the technique include one or more of the following features. The action is a URL (Uniform Resource Locator). The layers of the

5 artwork are composited and the area and the action are converted to a target output format. The target output format is HTML (HyperText Markup Language). A boundary of the non-transparent region is calculated and a definition of the area is calculated from the boundary. The composited

10 artwork is written out as an image file and an HTML file is written out; the HTML file contains an image map for the area and a URL for the action, and refers to the image file.

Among the advantages of the invention are one or more of the following. An image object associated with a

15 hot spot can be edited, and the hot spot will be conformed automatically to the edited object. The content of a layer defining a hot spot can be dynamic, that is, computed from other data at the time the layers are composited, and the hot spot will be conformed automatically to the dynamic

20 content. Multiple hot spots can easily be created in a composite artwork. The method of assigning hot spots can be added easily to any graphics application that supports layers. The regions in the artwork layer by which a hot spot is defined do not have to be visible in the final

25 composited image. For example, a visibility attribute of a hot spot layer can be set to invisible, and the hot spot will still be generated.

Other features and advantages of the invention will become apparent from the following description and from the

30 claims.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic diagram of user interface elements in accordance with the present invention.

FIG. 2 is a flow chart of a method for creating a hot spot in an electronic artwork in accordance with the present invention.

DETAILED DESCRIPTION

A wide variety of systems exist by which a user, such as an artist, can generate an electronic artwork. Graphics applications -- that is, computer programs designed to enable a user to manipulate data or images, or to create images from data or from a library of shapes -- enable the user to produce an electronic artwork (a picture) interactively. Two such applications are Adobe® Illustrator and Adobe® Photoshop, available from Adobe Systems Incorporated of San Jose, California. In general, a picture can include text, images, and shapes.

Many graphics applications build a final image by compositing several image layers together. The image layers may be thought of as stacked sheets of acetate, with transparent and non-transparent areas. In computer programs, the color and density of the ink on the acetate sheet are generally represented by a color value and an opacity (or "alpha") value, respectively.

Each layer typically includes image data, an optional mask, and compositing controls. Typically, the image data is represented by an array of pixels, with each pixel having a color and, optionally, an opacity. Typically, too, the mask is represented by an array of pixels, with each pixel having an opacity. Alternatively, the image data or the mask or both can be defined

analytically, e.g., by using shape outlines, or by other
functions that map positions to color and opacity. In
addition, the image data and the mask can be dynamic, i.e.,
computed from other data at the time the layers are
5   composited.

FIG. 1 shows in schematic form a conventional
application window 102 displayed on a computer display
device by the graphical user interface of a graphics
application. Within the window 102 are displayed a window
10   104 showing a picture, and a layers palette window 106 and a
layer options dialog box 108 providing information and
controls in accordance with invention, by which a user can
cause a hot spot to be assigned to an area of the picture.

As shown in FIG. 2, a method 200 of assigning a hot
15   spot to an area in an electronic artwork operates in the
context of a digital image (that is, a picture) of a kind
that has or can have layers. Through a user interface, the
user performs a group of steps (steps 202) to select a layer
(which may involve creating a layer) (step 204), to assign a
20   hot spot to the selected layer (step 206), to select a shape
for the hot spot (step 208), and to select an action
identifier, such as a URL, for the hot spot (step 210).

The foregoing steps can be performed by the user
through the layer options dialog box 108 (FIG. 1), as
25   follows. The user enters a name in name box 110. This name
will be one of the names $NAME_1$ through $NAME_n$ of the layers of
the picture, which names are shown in the layers palette
rows 112-1 through 112-n. The name box 110, like the shape
box 116 and the URL input box 118, can be implemented to
30   provide pull-down menus showing permissible or most recently
used values.

- 5 -

By checking check box 114, the user indicates that the selected layer is to be used to define the area of a hot spot. In the illustrated implementation, this is done by creating an image map. The shape of the hot spot is

5   indicated by the user in shape box 116 and the action to be associated with the hot spot is indicated in URL box 118. In the illustrated implementation, the permitted shapes are those supported by a target HTML format, namely rectangle, circle, and polygon, and the actions supported are URLs

10   (Uniform Resource Locators). When a hot spot has been assigned to a layer, the assigned URL is displayed with the layer name, as indicated in rows 112-1 and 112-n. If no hot spot has been assigned, no URL would appear. The application associates the hot spot information -- the shape

15   and the URL -- with the layer as a property of the layer.

At some time, the user will instruct the application to produce a form of output that includes hot spots (step 220, FIG. 2). In the illustrated implementation, in which the hot spot is an area of the picture and the target file

20   format is HTML, this can occur when the user requests the application to show a preview of the artwork in a browser or when the user requests the application to export the artwork as an image file referred to by a generated HTML file.

In response to the request, the application

25   composites the layers of the picture, as it would have done in the absence of hot spots, and the application prepares the hot spot information for output or display, as will now be described. If the graphics application supports dynamic content in layers, the dynamic content for the layers used

30   to define hot spots is calculated before the hot spots are calculated.

In selecting a layer to define a hot spot, the user
will naturally select a layer that has one or more
non-transparent regions in a transparent frame. The
non-transparent region or regions in combination define the
5   area of the hot spot. Each non-transparent region is
converted to a perimeter boundary path to which the selected
shape is fit (step 222). This may be done by tracing the
outer boundary of each non-transparent region in the layer.
In one implementation, the pixels in the layer are
10   scanned and a 1-bit deep bitmap is created for each
non-transparent region. For each identified non-transparent
region, the outer boundary is traced to create a polygon
approximating the outer boundary of the region's original
pixels. If shape other than a polygon is requested, the
15   polygons are converted to the requested shape. The union of
the one or more shapes formed in this way defines the area
of the hot spot, which may be non-contiguous and therefore
may generate multiple image maps in an HTML implementation.
In one implementation, the regions are found as
20   follows. The pixels in a copy of the layer (which may be a
partial copy) are scanned in a regular fashion. When the
first non-transparent pixel is found, it is given a
recognizable value and is used as a seed pixel in a seed
fill algorithm that is applied to find all contiguous
25   non-transparent pixels, each of which is given the same
recognizable value. In this way, the application finds a
contiguous region in the layer. The bounding box of the
region (the minimum rectangle that includes all pixels of
the region) is calculated and stored to use in optimizing
30   later processing. The scanning process is then resumed.
When a non-transparent pixel is found, the application

determines whether it is part of a region that has already been found. If it is not, it is given a different recognizable value and the process of finding the extent of the new region is repeated beginning with this new seed
5   pixel. The process continues until all pixels have been scanned.

In one implementation, any holes within a region are ignored. In an alternative implementation, a region having holes is separated to create separate regions that do not
10   contain holes, and the shapes formed from the separate regions contribute to defining the area of the hot spot, as has been described.

Having information necessary to specify a hot spot -- namely one or more formed shapes and a URL (or other
15   action request) -- the application converts this information in the target output format, such as HTML (step 224).

The application may also have to convert the composited picture to a target output format, such as GIF (Graphics Interchange Format), JPEG (Joint Photographic
20   Experts Group), or PNG (Portable Network Graphics).

Having both the composited picture (from step 230) and the hot spot information in the target output format (from step 224), the application can write the composited image with the hot spot information as a file, display it on
25   a display device, or print it. In the illustrated implementation, the target output format is HTML.

The invention can be implemented in digital electronic circuitry or in computer hardware, firmware, software, or in combinations of them. Apparatus of the
30   invention can be implemented in a computer program product tangibly embodied in a machine-readable storage device for

execution by a computer processor; and method steps of the invention can be performed by a computer processor executing a program to perform functions of the invention by operating on input data and generating output. Suitable processors

5   include, by way of example, both general and special purpose microprocessors. Generally, a processor will receive instructions and data from a read-only memory and/or a random access memory. Storage devices suitable for tangibly embodying computer program instructions include all forms of

10   non-volatile memory, including by way of example semiconductor memory devices, such as EPROM, EEPROM, and flash memory devices; magnetic disks such as internal hard disks and removable disks; magneto-optical disks; and CD-ROM disks. Any of the foregoing can be supplemented by, or

15   incorporated in, specially-designed ASICs (application-specific integrated circuits).

Other implementations are within the scope of the following claims.

What is claimed is:

1   1. A method for creating electronic artwork with a hot
2   area, comprising:
3   for a selected layer of the artwork, identifying a
4   non-transparent region of the layer, calculating a
5   definition of an area corresponding to a boundary of the
6   region, and assigning an action to the area, the action
7   defining a function that is activated when the area is
8   selected.

1   2. The method of claim 1, wherein:
2   the action is a URL (Uniform Resource Locator).

1   3. The method of claim 1, further comprising:
2   compositing the layers of the artwork; and
3   converting the area and the action to a target output
4   format.

1   4. The method of claim 3, wherein:
2   the target output format is HTML (HyperText Markup
3   Language).

1   5. A computer program, tangibly stored on a
2   computer-readable medium, comprising instructions for
3   causing a computer to:
4   identify a non-transparent region of a layer of an
5   electronic artwork; and
6   assign an action to an area corresponding to the
7   non-transparent region, the action defining a function that
8   will be activated when the area is selected.

1   6.   The computer program of claim 5, further comprising
2   instructions to:
3   calculate a boundary of the non-transparent region; and
4   calculate a definition of the area from the boundary.

1   7.   The computer program of claim 5, further comprising
2   instructions to:
3   composite the layers of the artwork; and
4   convert the area and the action to a target output
5   format.

1   8.   The computer program of claim 7, wherein the target
2   output format for the area and the action is HTML.

1   9.   The computer program of claim 8, further comprising
2   instructions to:
3   write out the composited artwork as an image file and
4   write out an HTML file containing an image map for the area
5   and a URL for the action, the HTML file referring to the
6   image file.

ABSTRACT OF THE DISCLOSURE

Apparatus and methods implementing a technique for
creating an electronic artwork with a hot area. For a
selected layer of the artwork, a non-transparent region is
5   identified and an action is assigned to an area
corresponding to the non-transparent region, the action
defining a function that will be activated when the area is
selected. The technique is advantageous in computer
application programs that composite images from layers and
10   for producing HTML (HyperText Markup Language) output that
refers to a corresponding composited image, where the action
is a URL and the area is defined by an image map.

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FIG. 1

← 102

APPLICATION WINDOW

MENU BAR

IMAGE DOCUMENT NAME   ← 104

106

LAYERS PALETTE

112-1 → PROPERTIES$_1$	THUMBNAIL$_1$	NAME$_1$ URL$_1$
⋮	⋮	⋮
112-n → PROPERTIES$_n$	THUMBNAIL$_n$	NAME$_n$ URL$_n$

LAYER OPTIONS

┌110

Name [   ]   [OK]

108 →

[Cancel]

┌114
□ Use Layer As Image Map

┌116
Shape [   ]

┌118
URL [   ]

FIG. 2

200

DIGITAL IMAGE

202

204
USER SELECTS A LAYER

206
USER REQUESTS "USE LAYER AS IMAGE MAP"

208
USER SELECTS A SHAPE

210
USER SELECTS AN ACTION IDENTIFIER (URL)

220
USER REQUESTS OUTPUT WITH HOT SPOT

222
TRACE NON-TRANSPARENT REGION(S) TO FORM SELECTED SHAPE

224
CONVERT FORMED SHAPE AND URL TO OUTPUT SYNTAX (E.G., HTML)

230
COMPOSITE IMAGE

240
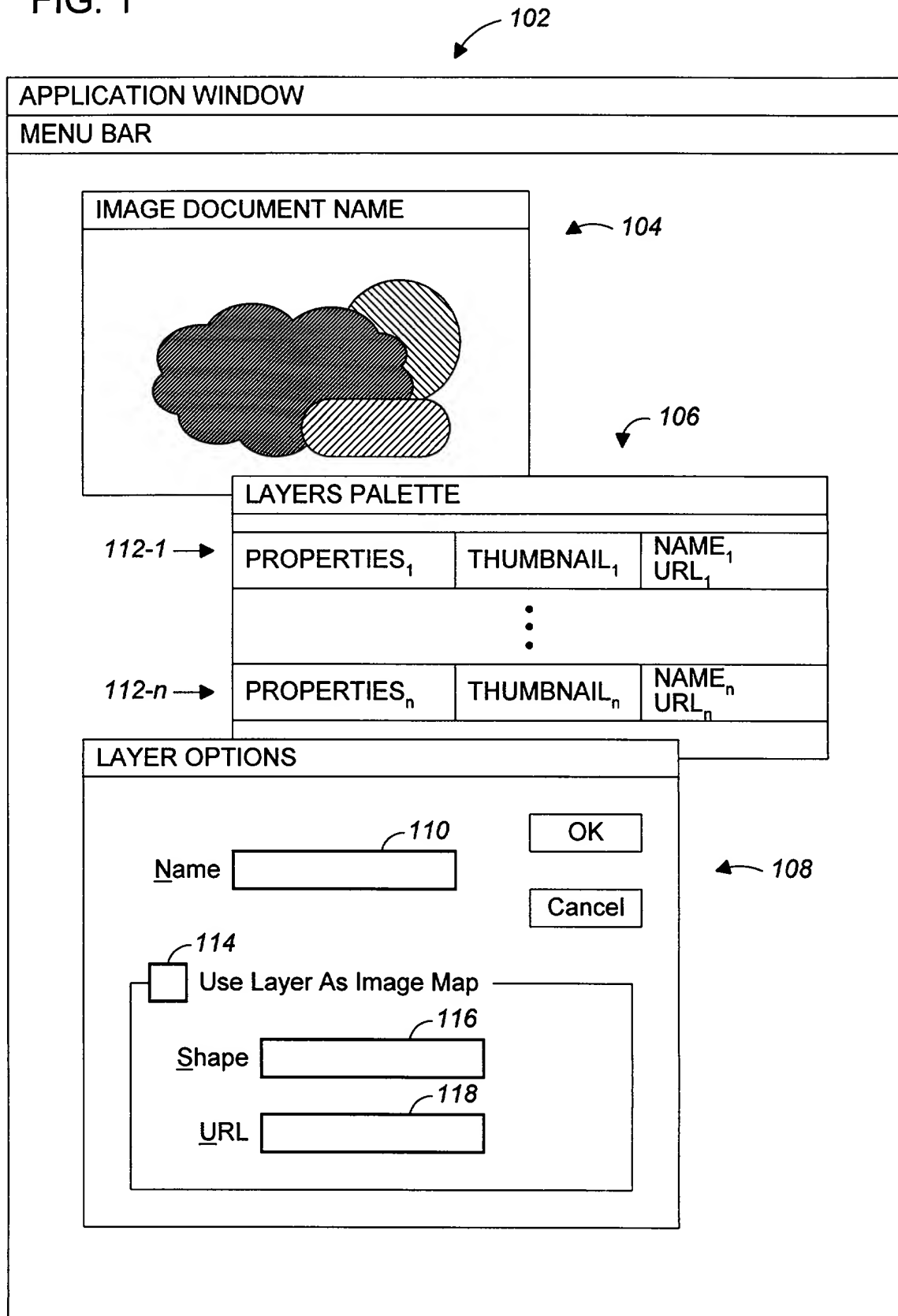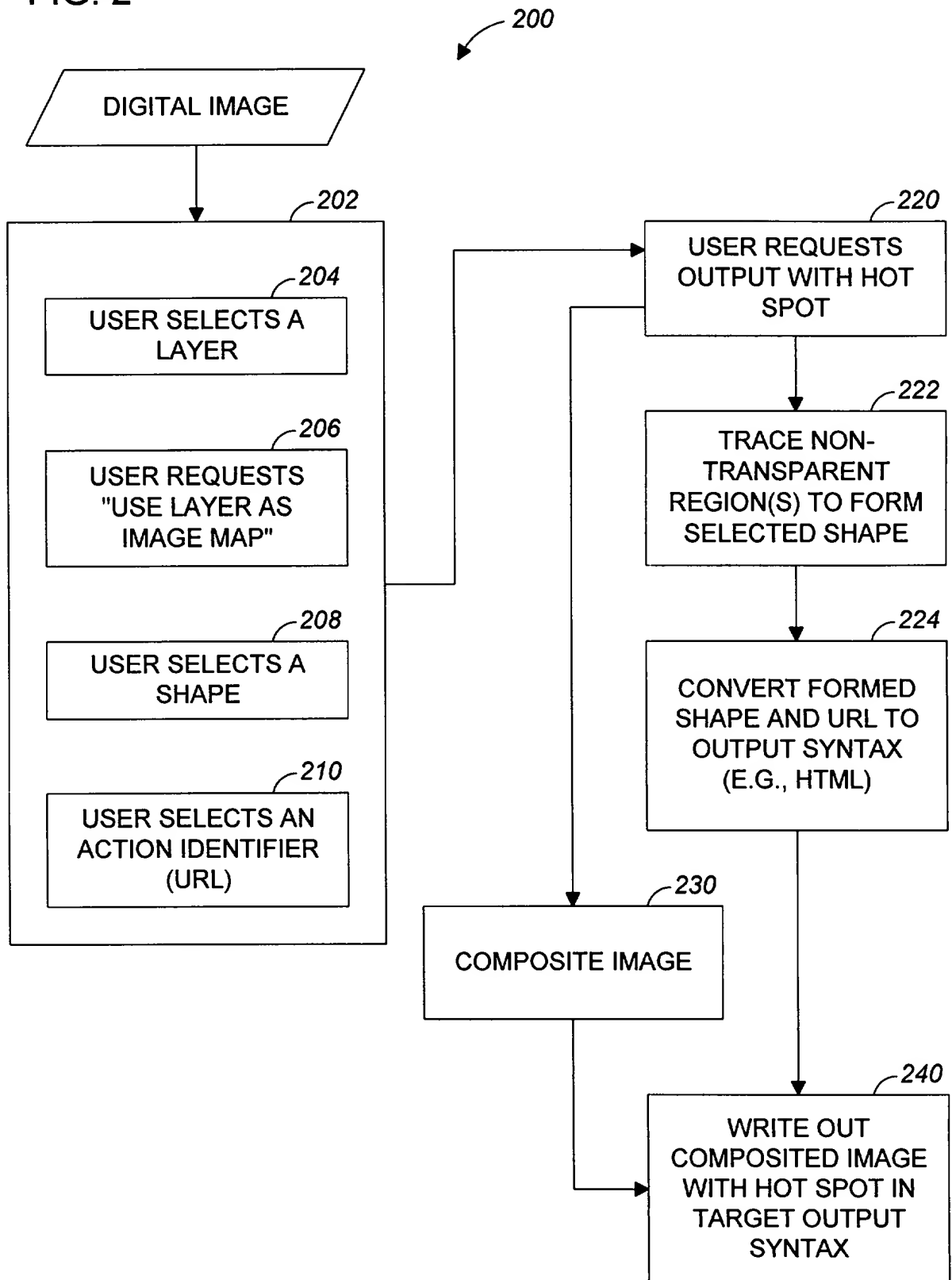WRITE OUT COMPOSITED IMAGE WITH HOT SPOT IN TARGET OUTPUT SYNTAX

COMBINED DECLARATION AND POWER OF ATTORNEY

As a below-named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

ASSIGNING A HOT SPOT IN AN ELECTRONIC ARTWORK

the specification of which:

[ ] is attached hereto.

[x] was filed on <u>April 10, 1998</u>, and identified as Attorney Docket No. <u>07844/273001</u>.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, code of Federal Regulations, Section 1.56(a).

I hereby appoint the following attorneys and/or agents to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

Roger S. Borovoy, Reg. No. 20,193; Hans R. Troesch, Reg. No. 36,950; John F. Land, Reg. No. 29,554; David J. Goren, Reg. No. 34,609; Mark D. Kirkland, Reg. No. 40,048; John D. Cowart, Reg. No. 38,415; John C. Phillips, Reg. No. 35,322; Dan C. Hu, Reg. No. 40,025; Coe F. Miles, Reg. No. 38,559; Denis G. Maloney, Reg. No. 29,670; David L. Feigenbaum, Reg. No. 30,378; Stephan J. Filipek, Reg. No. 33,384; Bao Q. Tran, Reg. No. 37,955

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[X] For Assigned Inventions: I understand that the purpose of making this appointment is to permit prosecution of patent applications for the above-identified invention for the benefit of my assignee, and that this appointment does not create an attorney-client relationship between me and these appointees.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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